Chapter 1.

Introduction
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Soil contains microorganisms such as bacteria, viruses, fungi, actinomycetes, protozoa and algae (Alexander, 1977; Olowonihi, 2003). Soil organism participates in the genesis of the habitat, which they live. They, together with the total biota and especially the higher vegetation, constitute one of the five interactive factors in soil formation; the other four are climate, topography, parent material, and time (Beare, 1997). The physical and chemical breakdown of rocks to fine particles with large surface areas and the accompanying release of plant materials initiate the soil forming process (Paul and Clerk, 1996). Two major nutrients that are deficient in the early stages of the process are carbon and nitrogen, therefore, the initial colonizer of soil parent material are often organisms capable of enhancing photosynthesis and nitrogen fixation. These are predominantly the cyanobacteria, also known as the blue green algae (Sylvia et al., 1997). After higher vegetation has become established, a continuum of soil processes produces the dynamic mixture of living and dead cells, soil organic matter (SOM), and mineral particles in sufficiently small sizes to permit the intimate colloidal interaction characteristic of soil (Lambart et al., 1979; Andrew et al., 2008).

The Ascomycetes constitute the largest class of fungi; the number of known species being approximately 32,000. There is considerable diversity of form and structure among the ascomycetes. At one end of the scale are the truffles and morels (Adamas et al., 1999). The ascomycetes derive their name from the ascus, the sac like vessel which contains the sexual spore’s ascospores. The ascus is a walled receptacle enclosing the spores and usually rupturing at the physical and nutritional factors where a pronounced affect on sporulation of fungi occur temperature, light, hydrogen ion concentration, aeration and humidity are some of the important physical factors. Factors such as source of carbon, nitrogen, vitamins and trace elements also determine the rate of spore development under natural conditions (Michael and Donald, 1996; Ivan et al., 2008). It has been discovered that micro-organisms play an important role in the fertility of the soil, their abundance and existence is solely hung on the environmental conditions (Paul and Clerk, 1989). The relationship between biodiversity of soil fungi and ecosystem function is an issue of paramount importance; particularly in the face of global climate change and human alteration of ecosystem processes. Fungi are the important component of the soil micro biota typically
constituting more of the soil biomass than bacteria, depending on soil depth and nutrient conditions (Ainsworth & Bisby, 1995). The saprobic fungi represent the largest proportion of fungal species in soil and they perform a crucial role in the decomposition of plant structural polymers, such as, cellulose, hemicelluloses, and lignin, thus contributing to the maintenance of global carbon cycle. Many of the papers on the distribution of fungi in soil have dealt with species in agricultural soils, and less is known about the occurrence of fungi under natural soil conditions (L. Young 1930). The question like distribution of fungi in such soils has received little attention. L. Young (1930) pointed out that in order to obtain a fair idea of an endemic microflora; soils should be examined from localities such as forests, peat bogs and mountains which remain untouched by man. The numerous studies on soil fungi made gradual grown up the concept of a fungal flora of the soil, fungal flora may vary depend on its native soils (Shi et al., 2002; Gleason et al., 2004). Some fungi are widely distributed in soil and others are limited to certain habitats. The distribution of these organisms is influenced by the abundance and nature of the organic content of the soil, as well as by other soil and climatic conditions, surface vegetation and soil texture (Waksman, 1944; Marschner et al., 2003). While the general nature of the soil microflora has become recognized, in detail, particularly the ecological variation of its members, are not always clear. Sporulation of fungi is the most important characteristic for fungal identification. However, most fungal isolates in this study cannot identify due to the lack of sporulation. Non-sporulating isolates are generally termed ‘myceliasterilia’ and grouped as ‘morphospecies’ based on similarity in cultural characteristics such as colony surface texture, hyphal pigments, exudates, margin shapes and growth rates (Lacap et al., 2003). Fungi are essential components of all ecosystems. Their various roles include acting as symbiotic partners, decomposers, and nutrient cyclers and as sources of food for vertebrates and invertebrates.

Soil supports the growth of a variety of unstressed plants, animals and microbes. Fungi are microscopic cells that usually grow as long threads or strands called hyphae which push their way between soil particles, root and rocks. Hyphae are usually only several thousands of an inch (a few micrometers) in diameter. Hyphae sometimes group into masses called mycelium. Fungal fruiting structures are made of hyphal strands, spores. Fungi performed important services realated to water dynamics, nutrient cycling, and disease suppression. Along with bacteria, fungi are
important as decomposers in the soil food web. They convert hard to digest organic material into forms that other organisms can use. Fungal hyphae physically bind soil particle together creating stable aggregates that help increase water filtration and soil water holding capacity. Fungi are aerobic organisms soil which becomes anaerobic for significant period generally loses its fungal component. Anaerobic conditions often occur in water logged soil and in compacted soil.

Most soil organisms cannot grow outside of soil, so it is necessary to preserve healthy and diverse soil ecosystem. Estimated numbers of soil species include 30,000, bacteria, 1,50,000 fungi, 60,000 algae (Pankhurst, 1997). The organisms of the fungal lineage include mushrooms, rusts, smuts, puffballs, truffles, morels, molds and yeasts as well as many less known organisms (Alexopoulos et al., 1996). Within their varied natural habitats fungi usually are the primary decomposer organisms present. Many species are free living saprobes in woody substrates, soil etc. In some low nitrogen environments several independent groups of fungi have adaptations such as nooses and sticky knobs with which to trap and degrade nematodes and other small animals. A number of references on fungal ecology are available (Carrol and Wicklow 1992; Cooke and Whips, 1993; Dix and Webster, 1995). Fungi and bacteria are the principal decomposers that release carbon, nitrogen and other elements that otherwise would become tied up in organic matter (Carlile et al., 2001). Fungi play an important role in decomposing forest litter or dung, fruits or other organic materials. Farms fruits and crops are vulnerable to fungal attack and 10% to 50% of the world’s harvested fruit is lost each year due to fungal attack (Campbell and Reece, 2002). However, fungi also have a number of practical uses for humans. The distinctive flavours of certain kinds of cheeses, including Roquefort and blue cheese, come from the fungi used to ripen them.

The soft drink industry uses Aspergillus niger to produce citric acid. Beside that, a family of unicellular fungi, Saccharomyces cerevisiae is the most important fungi used in the food industries such as in baking, alcohol brewing and wine making. Apart from food industries, fungi are medically valuable as antibiotic producers used to treat infections (Thom 1945). The Penicillium spp are among the most commonly occurring and economically important members of microfungi family. Although much is known about Penicillium physiology and mycotoxin chemistry. One of the main challenges is in the area of rapid and reliable identification of Penicillium in many settings including community health care, occupational health and food safety (Scott,
More recent studies conducted at the beginning of the 21st century indicate that during the winter season the microbial community of Arctic soil is dominated by saprotrophic fungi (Schimel and Mikan 2005), but fungal activity during the growing season cannot be neglected because of its important role in supplying arctic plants with mineral nutrients (Schmidt and Bölter 2002). Tropical environments differ ecologically from temperate habitats in physical, chemical and biological attributes (Lacher and Goldstein, 1997). They are characterized by warmer temperature, with little or no seasonality, and heavy precipitation during at least part of the year. Although tropical habitats only occupy 25.7% of the land area of the earth, they harbor the bulk of the world's species (Deshmukh, 1986) Raven (1988) suggested that 2/3 vascular plant species occur in the tropics. Biodiversity of fungi in the tropics is also very high. Numerous new taxa have been described from the tropics in the last decade despite the fact that few mycologists are located in these regions (Hyde and Hawksworth, 1997). There are probably 1 million fungal species on tropical plants alone yet to be discovered (Hawksworth, 1993).

Freshwater fungi are a cosmopolitan group which includes zoosporic fungi, ascomycetes, zygomycetes, deuteromycetes and basidiomycetes (Goh and Hyde, 1996). They play a crucial role in the freshwater ecosystem in nutrient cycling by breaking down leaves and woody substrates (Wong et al., 1998). However, many other fungi are biotrophs, and in this a number of successful group form symbiotic associations with plants, animals, and prokaryotes examples Lichens, Mycorrhizae, and leaf and stem endophytes. In addition a number of fungi are used in the processing and flavouring of foods and in production of antibiotics and organic acids. A few species are studied as model organisms that can be used to gain knowledge of basic processes such as genetics, physiology, biochemistry, and molecular biology with results that are applicable to many organisms (Taylor et al., 1993). Wherever adequate moisture, temperature and organic substrates are available fungi are present. It is important to recognize that optimum conditions for growth and reproduction vary widely with fungal species. Diversity of most groups of fungi tends to increase in tropical regions but detailed studies are only in their infancy (Issac et al., 1993). Endophytes are a more recent discovery and some of these fungi can protect the plants they inhabit from herbivory. Fungi are most important plant pathogen and include rusts, smuts. Among the other well known association
are fungal parasites of animals. However, soil contains more genera and species of microorganisms than other microbial habitats, some of these species are present at low numbers, because the conditions for their survival and growth are restricted to discrete sites in which the nutritional and other physicochemical environmental factors necessary for their establishment, growth and survival. Soil is mainly characterized by three different horizons. Soil horizons formation depends on influence of climatic factors, types of different macro and microorganisms, parent rock composition and their proportion, topography and percentage of lime, all of which control the weathering of rock. All these zones have recognized sub-zones A₁, A₂, A₃ and so on. The A horizon is formed by the occultomotion of organic matter and its decomposition by microbes through various microbial activities therefore it is a complex of organic nutrients and nutrients rich horizon. The B horizon is characterized by accumulation of silicate and clay minerals while C horizons consist of weathered parent rock material. Physically, chemically and biologically all these three horizons are interlinked where the D horizons consists of hard rocks. Physical property of soil depends upon morphology of the soil particles, their size and arrangement in the soil. Texture of soil is explained by percentage of sand, clay and silt in it. Soil particle occupy more than half of space in the soil remaining space between the particles is pores space is filled by water and air therefore soil operation plays important role in maintaining soil environment which suitable for the activities of microorganisms. The other effective factor in the soil is moisture, water holding capacity and retention of water in the soil and their availability to the associated microorganisms is important for the growth of the microorganisms. Other important factor is pH play vital and essential role in stabilizing soil environment. On the basis of hydrogen ion concentration in soil, soil is classified into acidic, basic, alkaline and neutral. Sometime neutral soil also support the favourable growth of microorganisms. Soil temperature is other important variable parameter influences microbial activity. It is observed that fungal growth often takes place in the range of 25⁰C - 27⁰C, However slight changes in temperature affect the physiological reactions of microbial cells changes the soil environment therefore some microorganism require specific environment multiplication. Soil is best natural medium for fungal growth which is a complex of macro and micro nutrients such as C, H, P, Ca, K, S, Fe, Mg, Cl, Mn, Mo, B and Zn. Organic matter in soil
is some of N,P and S for plant growth therefore organic matter is decomposed by microorganisms is essential to release nutrients. Myxomyetes have absorbtive and phagotrophic nutrition, the feeding plasmodia of the slime moulds Physarum and Stemonites produce extracellular enzyme amylase that breaks down starch to simple sugars. Among water moulds some members like Pythium and Phytophthora are plant pathogens others are mycoparasites thus potential biological control agents of plant pathogenic fungi.

Communities of soil fungi vary with respect to vegetation and abiotic factors of the soil including season. Soil fungal community analysis has been rare because of the difficulties and scale involved in isolation and identification of soil mycota. Surveys indicate that certain species of fungi are characteristics of particular type of vegetation species of Penicillium and Mortierella are common in temperate to high latitude. Species of Aspergillus are common in grassland and desert at low latitudes Fusarium and Periconia are characteristics of grassland soils where as Mortierella, Mucor, Penicillium, are common in forest soil. Certainly there is remarkable diversity in soil fungal community. Pugh 1981 stated that the majority of fungi isolated from soil are ruderal organisms suited by high rates of sporulation and growth to constitution low stress sites and high disturbance. The decomposition of plant waste brings out by soil fungi by natural cycles. Several mechanisms have been suggested by which wood decaying fungi can acquire and conserve the nitrogen necessary for growth, production of lignolytic enzyme and production of massive sporophores. The decay community may also show succession base on season as well as substrate quality. Among saprophytic can tolerate or operate most efficiently at temperature above 35°C. Soil bacteria and fungi play pivotal roles in various biogeochemical cycles (Molin and Molin, 1997; Trevors, 1998b; Wall and Virginia, 1999) and are responsible for the cycling of organic compounds. Soil microorganisms also influence above ground ecosystems by contributing to plant nutrition (George et al., 1995; Timonen et al., 1996), plant health (Srivastava et al., 1996; Filion et al., 1999; Smith and Goodman, 1999), soil structure (Wright and Upadhyaya, 1998; Dodd et al., 2000) and soil fertility (Yao et al., 2000; Donnell et al., 2001). Soil microbes play important role in soil ammonification and nitrogen fixation because of these they play a vital role in soil formation that is useful in agriculture to stimulate plant growth and also
increases soil fertility. The soil microorganisms from plant and animal kingdom play important role in the development of microclimate. In the plant kingdom fungi, bacteria, and actinomycetes are active in developing a mycoflora. In the animal kingdom amoebae and flagellates are the most abundant but ciliates and nematodes are large in numbers. The mites and arthropods involve in the soil.

Composition of soil is maintained by all these microorganisms and organisms. In India near about 25 different soil types are recognized (Alexander, 1961) of these few soil types have been studied for different purposes such as red soil, the laterite soil, the black soil and alluvial soil. In India near about 14% of the total area of the soil is desert and alkaline are unfit for crop cultivation.

Till the 19th century it was believed that only bacteria are responsible for most of soil processes other present groups like fungi and algae were more or less neglected and did not attempt for the systematic studies of soil population. During the last century the importance and contribution of fungi and algae and other microorganisms in the soil processing fair well understood. It was found that besides bacteria fungi and algae also exert a good variety of synergistic and antagonistic effects and their activities have definite role in soil fertility. In most aerated and cultivated soil, after the bacteria the fungi are account for the second largest part of the total microbial population. The large diameter and extensive network of fungal filaments is due to the dominance of this mass. (Alexander, 1961).

Fungi are heterotrophic organisms present in soil in the form of saprophytes or parasites in form of vegetative, reproductive or modified resting structures such as chlamydospores, resting spores or sclerotia. Rolfe and Rolfe (1926) called saprophytic fungi as vegetables vultures since they act as scavengers in plants. Fungi in soil are indespensible agents in maintaining the essential balance of the nature. Though the fungal flora in soils more or less said to be cosmopolitan in general, few fungal species may be more or less restricted to a particular type of soil therefore, term soil fungi is generally applied to the heterogenous collection of fungi isolated from soil. The physical and chemical properties of soil have great impact upon the soil mycoflora. The physical and chemical composition of soil determines the generic composition and size of the mycoflora. The environment to which the fungi are exposed like organic matter status, pH, moisture, air, temperature, position in soil profile, season of the year and
the composition of the vegetation determine the composition of soil mycoflora. Thermophilic fungi have worldwide distribution. It seems more likely that a generally world wide distribution is a result of the world wide occurrence of self heating masses (Maheshwari et al., 1987). Thermophilic fungi have been reported from various natural habitats such as soils and in habitats where decomposition of plant material takes place. These include compost and wood chip piles, nesting material of birds, animals and municipal refuse. Accumulation of organic matter where in warm, humid and aerobic environment provides the basic physiological condition, in these habitats thermophiles may occur either as resting propagules or as active mycelium depending on the availability of nutrients and favorable environment (Khushaldas, 2009). Cooney defined thermophilic fungi as those which can grow at a temperature within the range of 20-50ºC. Thermophilic microorganisms form a diverse group of organisms found in various habitats characterized by different environmental conditions. *Aspergillus fumigatus* abundant in most of the sources and higher in the decomposing litter material. *Mucor species* were also widely distributed and highest in the underground coal mine soil. The general *Chaetomium* and *Torula* were restricted to vermicompost *Myriococcum albomyces* and *Penicillium duponti* were recovered from poultry litter and *Humicola lanuginosus* were highly distributed in all sources. *H. insolens* and *H. grisea* were isolated from cattle dung. *Mucor miehei* was recovered from zoo dung and *Chaetomium dissitum* were recovered from municipal waste. The genera *Aspergillus* were observed in all substrate. *M. pusillus* and *M. miehei* showed rapid growth at 45 ±2ºC. *H. lanuginosus* showed good growth at 52 ±2ºC which was the highest optimum temperature range among all the fungi. *Torula thermophila* had the optima between 47ºC to 50ºC. *Humicola insolens* showed rapid growth at 47ºC. *Chaetomium thermophile* had their optimum between 38-42ºC. *Mucor* sp. occurred with highest percentage of incidence in industrial waste. Eggins et al (1972) used an immersion perfusion technique to screen fungi growing in soil and reported widespread occurrence of thermophilic fungi in soil, remaining dormant in shaded soil but becoming active in sun-heated soil. Jack and Tansey (1977) studied development of thermophilic fungi in pure cultures in petri dishes which had been sealed and then buried in field soil. All species tested germinated and sporulated under these conditions, leading to the view that the extent and duration of elevated temperatures reached in sun-heated soil are sufficient for thermophilic fungi to complete life cycle in soil. Optimum temperatures for mycelial growth of all isolates were between 20ºC
and 25°C for all media tested. Mycelial growth of all isolates occurred between pH 4 and 9, with an optimum of pH 5.6. Fungi can develop over a wide range of pH of 2.0-10. They require adequate moisture and aeration. Since majority of fungi are aerobic and they can survive only in well aerated soil or rarely under microaerophilic condition. Most of the fungi are mesophilic, though thermophilic and thermotolerant forms occur, especially in areas where organic matter decomposition takes place.

Some of the soil fungi are economically important as they produce antibiotic e.g. species of *Aspergillus*, *Penicillium*, *Cephalosporium* etc. Soil mycoflora has important role in agriculture. Soil-borne pathogen produces serious losses to the yield of different plant groups (Iftikhar et al., 2003). Microorganism that colonized in rhizosphere were classified according to their effects on plant, some of these microorganisms considered plant pathogen, whereas others trigger beneficial effects, (Mantellin and Touraine 2004). Fungi with antagonistic activity toward plant pathogen had an essential role in plant growth and health. A plant and site dependent specificity of the composition of antagonistic morphotypes and their genotypic diversity was found (Berg et. al., 2005). Many studies showed that root colonization by specific fungi was found recently gave increases in plant growth, yield and measurable control of known root pathogens (Cook, 1993, Linderman, 1986 and Cook & Baker, 1983). *Fusarium* species were economically important as pathogens on most agriculture, horticultural and field crops grown in the world. Many common *Fusarium species* were saprophytic, mycotoxigenic, or caused infections for humans and animals. In the Kingdom of Saudi Arabia, root rot diseases were recorded on 40 host plant. *Rhizoctonia solani* was the dominant fungus for these diseases followed by *Fusarium* spp (Kassim et. al., 1987). Many plants were attacked by *Rhizoctonia solani*; these included over 500 hosts in the United States alone (Farr et al., 1989). Chet, et. al., showed that several species of *Trichoderma* were used successfully against certain pathogenic fungi. Among these *Trichoderma harzianium* was the species most often used for biological control against soil borne phytopathogenic fungi. It was commercially available as F-Stop for control of several soil-borne plant pathogenic fungi. Rodriguez and Cotes (1999) showed that *Trichoderma Koningii* when added to the soil or as seed treatment, significantly increased the percentage and speed of germination, protecting 82% of *Phaseolus vulgaris* seeds against symptoms and also plant vigour was significantly increased. *Trichoderma* spp was used as commercial
biofungicides to control a range of economically important soil-borne fungal plant pathogens. The antagonistic activity of biocontrol *Trichoderma* strains was attributable to one or more complex mechanisms, including nutrient competition, antibiosis, the activity of cell wall-lytic enzymes, and induction of systemic resistance and increased plant nutrient availability. (Harman, 2000).

Species of *Aspergillus* and their *Emericella, Eurotium* and *Neosartorya* sexual states, isolated from soils or collected on natural substrata in Santa Rosa National Park in northwestern Costa Rica. Few studies have focused on *Aspergillus* in Costa Rica. Thirteen species were reported in a check list of Costa Rica fungi (Covington, 1980). The majority of those reports were based on two studies of Panamanian and Costa Rican soil fungi where isolates of agricultural and forest soils from southern Costa Rica were enumerated (Farrow, 1954; Goos, 1960). The potential diversity of *Aspergilli* in Costa Rica and Central America was revealed by Raper and Fennell their monograph of *Aspergillus* (1965) when they described 12 new species from soil isolates. Subsequently, during a monographic revision of the black *Aspergilli, A. heliconthrix* (Musallam, 1980).

Microbial analysis of different soil samples of selected site in Obafemi Awolowo University, Nigeria was investigated by Ogunmwonyi et al. (2008) they found *Aspergillus niger* as a dominated fungi among all. Kavita Sharma (2010) also found *A. fumigatus* dominated in different fungal species. Baxter and Illston (1980) found some fungal species such as *Alternaria alternate, Chrysosporium panorum, Cladosporium cladosporioides, Fusarium sp., Mucor hiemalis, M.racemosus* etc. from low temperature region of New Zealand, Kavita Sharma (2010) also found similar fungal genera such as *Alternaria, Cladosporium, Mucor* etc. from the low temperature region of Gabgtok. Fungi belonging to genera *Acremonium, Aspergillus, Cladosporium, Fusarium* and *Trichoderma* were isolates from Antarctic soils by Singh et al. (2006). Species of *Penicillium* and *Trichoderma* were found from different tea growing locations in India by Pandey et al. (2001). The fungi were isolated from mesophillic temperature ranges of 15°C to 35°C. About 90 fungal stains were isolates form the soil of Kotri barrage, Pakistan by Suhail et al. (2007). Among the 21 *Aspergillus* species isolated, the *A. niger* was found as dominant.

For the studies of soil fungi, several techniques have been developed and microbiologists and mycologists for isolation of soil fungi have employed number of methods. No single procedure however, doesnot describe the entire generic
composition of the mycoflora. Among them soil dilution plate method has been a popular one and still favoured by many workers. After taking into consideration the ecological and economic importance, selected group of such soil microorganisms has been studied by various workers. Mycologists in many countries have performed extensive studies of the genera and species that dominate in one or another ecological circumstances. These studies were concerned with the factors determining the composition of soil mycoflora.


Many workers proposed different systems of classification of fungi according to their convenience. The most recent and widely accepted system of classification
was proposed by Ainsworth (1973). This system is in accordance with the norms of International code of botanical nomenclature. In the present work taxonomic arrangement is based on that proposed by Ainsworth (1973) for use in the current edition of “Dictionary of fungi” 8th edition in 1995. He treated fungi as a separate kingdom with two divisions Myxomycota divided into three classes for plasmodial forms and the Eumycota for non-plasmodial forms are mycelial. Five sub-divisions are recognized viz Mastigomycotina, Zygomycotina, Ascomycotina, Basideomycotina and Deuteromycotina.

In Maharashtra Muzumdar (1966 and 1967) studied soil fungi from sugarcane fields from Pune and soil fungi of Khandala forest, Deshpande and Deshpande (1967), Gangavane and Deshpande (1972), investigate soil fungal flora of different soil types of Aurangabad, Patil et al. (1976) contribute to the knowledge of soil fungi of Pune, Ursekar (1977) studied the soil fungi of Mahabaleshwer, Kale (1981) studied the soil flora of western Maharashtra, Rane and Gandhe (2002) studied soil fungi of Jalgaon district, Kamble and Patil (2009) were isolated 13 genera from the soil sample of different Citrus fields of Satara and Gaigole et al. (2011) studied the antifungal activity of Trichoderma species, Jadhav et al. (2011) isolated five species of aquatic fungi belonging to five genera of fresh water hypomycetes found in foam samples collected from Trambakeshwar stream of Nasik District and Patil and Borse (2011) studied the conidia of water born hypomycetes from the river Tapti and Panzara of North Maharashtra represent both tropical and temperate fungi. Wahegaonkar (2011) isolated 85 species belonging to 45 genera from Aurangabad city. It clear that whatever work done in Maharashtra is mostly confined to regions of Western ghats and the remaining area of central Maharashtra remained unexplored about this work. The selected area of Kopergaon tahsil for the study of soil mycoflora has extremities of temperature about 8°C -11°C in winter and 40°C-45°C in summer and other several physicochemical factors. They have a remarkable impact on different soil habitats thus produce considerable changes in the mycoflora of the locality, hence the present study was undertaken. The study was carried mainly to investigate soil mycoflora, soil analysis, soil composition, and variation with reference to different soil types and their parameters in soil mycoflora. Distribution and occurrence of soil fungi in different localities, their seasonal occurrence, constant occurrence, sporadic occurrence, restricted and universal distribution were critically studied and discussed in this dissertation with data maintained for two years. Finally it
is necessary to work out the corelation analysis to find out the controlling factors for the soil mycoflora. The comparative account of the population of fungi of these soil has been worked out with a view of finding out population variation in different soils in relation to soil characters and environmental conditions. Thus the thesis included the results of work on the soil fungi of Kopergaon tahsil. The isolation of soil fungi, physiological aspects, study of occurrence and distribution of soil fungi of Kopergaon tahsil was carried out with the following scheme.

1. General survey of soils of Kopergaon tahsil was made and localities were fixed for regular soil sample collection.
2. Selection of localities was made on the basis of soil types such as irrigated, semi-irrigated, arid soil and river soil. Soil samples were collected at the 6 inch depth. Samples were used for inoculations and isolation.
3. Distribution of soil fungi and seasonal variation in the occurrence and fluctuation in the physicochemical parameters was studied.
4. Isolation, culturing and identification of the soil fungi and maintenance of their pure cultures in the laboratory.
5. Physiological studies of some of the fungal species isolated were made to select proper media. Data collected for two years of physicochemical parameters for various species of fungi was analysed statistically.

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